

CALIFORNIA ENERGY COMMISSION

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April 11, 2006

Paul D. Thayer, Executive Officer
California State Lands Commission
100 Howe Avenue, Suite 100-South
Sacramento, California 95825-8202

Dear Mr. Thayer:

Attached to this letter are responses to questions received from you and others regarding the possible effects of the State Lands Commission staff draft resolution pertaining to once-through cooling on the coastal power plant fleet. The questions are organized into three general categories:

1. California Energy Commission (Energy Commission) authorities and permitting issues for coastal power plants, and work by the Energy Commission on once-through cooling;
2. Current and anticipated operations of the coastal power plants and their contributions to California's electricity supplies; and
3. Considerations of the possible effects of the draft once-through cooling resolution on the operation and/or replacement of coastal power plants.

Please call me at 654-4496 if you have any questions or have your staff contact Chris Tooker at 653-1634 or Jim McKinney at 654-3999 if you require clarification, have questions, or further discussion is necessary.

Sincerely,

_____signed_____

B. B. BLEVINS
Executive Director

Attachment

Question 1 – What is the lead time for issuing permits for new generating capacity?

The Energy Commission has exclusive permitting authority for thermal power plants 50 megawatts (MW) or greater and serves as lead agency under the California Environmental Quality Act (CEQA) for projects within our jurisdiction. The Warren-Alquist Act specifies a mandatory 12-month time period to permit new power plants. Since deregulation of the electricity industry, the Energy Commission has permitted one retooling and three replacement power plant projects on the coast that use once-through cooling. The time it took the Energy Commission to permit these once-through cooling (OTC) projects ranged from 3 months for the Huntington Beach retooling project during the energy emergency to 43 months and 46 months for the Morro Bay and El Segundo projects, respectively. The Moss Landing project was permitted in 14 months. The Morro Bay and El Segundo Projects took far longer than the normal permitting time because of disputed issues regarding OTC and the time it took the applicants to supply requested information and address and resolve all the issues raised by the Energy Commission. Permitting time is often proportionate to the difficulty and controversy of the issues that need to be addressed, what issues are in dispute, and the level of community or intervener participation and concern.

In addition to the permit review time, applicants require about six to nine months to prepare an Application for Certification, and 18 to 24 months to construct a project. If an Energy Commission certified project is modified after certification, including modifications to the cooling system, the Energy Commission has jurisdiction over the modification and must approve the modification as an amendment to the decision. Depending on the type of modification, the amendment process normally takes two to six months to complete.

Question 2 – What is the process for re-permitting the existing plants that would be affected by this resolution?

This question raises several issues about how the coastal power plant owners may choose to respond to a State Lands Commission resolution on once-through cooling over a 14-year time period. The answer to the permit question depends on how each owner chooses to respond. Three response options are:

Option 1 – Owners choose to “only retrofit” the cooling system from once-through cooling to cooling towers or dry cooling, but not modify or replace (i.e. repower) the existing electrical generating system (including the gas and steam turbine generators).

Option 2 – Owners choose to repower the electrical generating system and switch to cooling towers or dry cooling.

Option 3 – Owners choose to replace the electrical generating system with a technology that does not require cooling, such as combustion turbine peaker units.

Under Option 1, if the power plant was not originally certified by the Energy Commission, the installation of cooling towers or a dry cooling system would either require a revision to the original local permit, or for a municipal utility owned project, a municipal utility permit, to ensure conformance with the California Coastal Act, any other affected existing permit conditions, and CEQA. If the power plant was originally certified by the Energy Commission, this option would require an amendment to the Energy Commission's decision and functionally equivalent CEQA documentation would be required and performed by the Commission. While there are environmental benefits derived from avoiding the use of once-through cooling, alternatives that require the use of cooling towers or dry cooling systems are more costly, require more space, and can result in visual and noise impacts. Cooling towers also require a source of reclaimed, ground or potable water. Current Energy Commission policy seeks to encourage the use of reclaimed or recycled water in lieu of fresh water for power plant cooling, but this policy would not apply to projects outside of our jurisdiction.

Under Option 2, an Energy Commission license would be required for facilities not originally permitted by the Commission only if the project modification resulted in a net generating capacity increase of 50 MW or more. If the Energy Commission previously certified the project, a modification of less than 50 MW would require an amendment to the original Energy Commission decision and a functionally equivalent CEQA process. If a local agency or municipal utility previously permitted the project, and the modification was less than 50 MW, the local agency or municipal utility would permit the modification and conduct the appropriate CEQA review. For example, the Los Angeles Department of Water and Power (LADWP) has self-permitted very large power plant replacement projects by keeping the net change below the Energy Commission's jurisdictional threshold.

Under Option 3 where new combustion turbines are installed, the permit requirements would be the same as for Option 2. Because cooling towers or dry cooling would not be needed, these issues would not be evaluated during the CEQA review.

Question 3 – What percentage of the energy actually used by California is generated at OTC coastal power plants? (Not the percentage of capacity). What is the capacity of plants to produce power versus the actual production? What is the relative contribution of the different types of power generators and how might that change over time?

In aggregate, the 21 large coastal power plants using once-through cooling generated 58,345 Gigawatt-hours (GWh) in 2004, which was 22 percent of total in-state electricity sales. The relative contribution of each technology is shown in the table below. The capacity factor of a power plant is a measure of the amount of energy it generates in one year. A 100 percent capacity factor means that a facility generates around the

clock each day and hour of the year. The 2004 capacity factors of the coastal power plants with once-through cooling are summarized below.

Technology	Capacity Factor (percent)	Generation as Percent of State Total (2004)
Steam Boilers	19.4	9.0
Combined Cycles	34.9	2.05
Nuclear	79.1	11.08
Combustion Turbine	2.1	0.04

Presently, the older steam boiler power plants operate at relatively low capacity factors on an annual average basis, but provide critical capacity reserves and energy production that are needed to meet peak demand during the summer months. As such, the above table does not adequately reflect the importance of the coastal plants to the state's electricity system, since their generation as a percent of state total is significantly higher during periods of peak demand when system reliability becomes a critical issue. Most of these coastal facilities have been operating at their full capacity during the highest peak demand periods of the summer. Over time, it is anticipated that many of the steam boilers will be replaced with more efficient generating technologies.

Question 4 – Please provide information concerning individual power plants – are any proposed for shutdown by 2020? What about those plants that intend to re-power? Which of these plants seem likely candidates for conversion to non-OTC cooling? Which plants seem obviously not to be a candidate (i.e., location and water limitations)?

As discussed later in the response to Question 9, two plants are no longer operational (Long Beach and Hunters Point), and two more (Humboldt and San Diego South Bay) have announced plans to repower without once-through cooling.

Plants that have recently repowered and the nuclear facilities would encounter difficult financial obstacles if they were to pursue a new cooling technology. Conducting a site-by-site feasibility assessment of cooling technology alternatives is a task that is beyond the scope and time frame of this letter.

Question 5 – What approach has been taken by the CEC and what authority and jurisdiction does the CEC have over OTC power plants?

As discussed in our responses to Questions 1 and 2, the Energy Commission has the legal obligation to thoroughly review potential environmental effects under CEQA for each application on a case-by-case basis and determine whether the impacts are significant and mitigable. The cases involving once-through cooling that have come before the Energy Commission have presented challenging analytic issues for our agency.

The Energy Commission and its staff have created an extensive body of knowledge on once-through cooling issues through its siting, planning and PIER programs, and through Commission-level policy reports and siting case decisions. In its 2005 Integrated Energy Policy Report, the Energy Commission provided the following policy guidance on once-through cooling:

1. Work collaboratively with agencies on OTC through the Ocean Protection Council.
2. Continue research on impact assessment protocols, impact reduction and alternatives to OTC.
3. Update Memorandums of Agreement (MOA) with SWRCB, RWBs and Coastal Commission to develop consistent regulatory approaches, including investigating retrofit control technologies (BARCT)
4. Update Data Adequacy Regulations for License Applications and for California Coastal Act consistency.

Question 6 – Are OTC considerations different for the two nuclear power plants?

Yes. California's two nuclear facilities represent billions of dollars in ratepayer investments and operate in a base load mode with very high capacity factors. They are a critical element of California's electricity supply system. Potential retrofits would be expensive and present engineering feasibility challenges. Very little information on the potential costs of retrofitting nuclear facilities to use cooling towers is available. In addition, it is unknown whether adequate supplies of reclaimed or fresh water, for example, are available for cooling purposes.

Due to their size and base load operation, the two nuclear facilities also use the largest volumes of sea water. Each plant is permitted to use more than 2,500 million gallons of sea water per day, which is twice as much as the next largest facilities on the coast (Alamitos and Moss Landing). Most of the other coastal facilities are permitted to use less than 1,000 million gallons per day. Due to the low capacity factors at most of the coastal plants, actual volumes of sea water used in once-through cooling are lower than their permitted levels.

Question 7 – At the stakeholders meeting, an attorney for Duke’s plant at Morro Bay said there were few if any impacts – is this correct and would that be true for the other plants?

In its June 2004 Third Revised Proposed Decision, the Commission found that environmental impacts from once-through cooling to the Morro Bay Estuary from the repowered Morro Bay Power Plant would be less than from the existing plant, and therefore did not constitute a significant environmental impact as defined in CEQA. The Commission Decision also stated that the 16.2 percent proportional mortality entrainment impact from the new facility was an adverse effect and would have to be mitigated in accordance with section 316(b) of the Clean Water Act. The Commission Order directed Duke to pay \$12.5 million to the Central Coast Regional Water Quality Control Board for a habitat enhancement program.

The consensus view of federal and state agency scientists that Energy Commission staff have worked with on power plant siting cases is that once-through cooling causes significant, ongoing impacts to marine and estuarine environments in California’s coastal waters.

Question 8 – What is being done to insure that new power plants will use alternative cooling systems and not OTC?

There is a substantial amount of work being conducted at the Energy Commission and at other agencies on the environmental impacts of once-through cooling and on the feasibility and development of alternative cooling technologies.

At the Energy Commission, repowering applications that include the continued use of once-through cooling are subject to a thorough regulatory review that includes compliance with Clean Water Act requirements, as implemented by the Regional Water Quality Control Boards, and an examination of feasible cooling alternatives, including the use of recycled water for either cooling towers or once-through cooling. Energy Commission PIER research on alternative cooling technologies is demonstrating that dry and hybrid cooling systems are feasible and economically viable in California.

According to the Energy Commission’s *2005 Environmental Performance Report of California’s Electrical Generation System*, 22 percent of the new capacity that was brought on-line between 1996 and 2004 used recycled water for cooling, while 52 percent of the capacity under construction or permitting review will use recycled water. Two power plants in California use dry cooling, and a third is under construction.

The Energy Commission staff continues to conduct and sponsor research into the scientific issues associated with better understanding and documenting the environmental effects of once-through cooling.

The recent US Environmental Protection Agency Phase I Rule for section 316(b) of the Clean Water Act effectively bans new power plants, excluding repowers, from using once-through cooling. The Phase II Rule for existing large power plants sets aggressive performance standards for entrainment (60 to 90 percent reduction from baseline) and impingement (80 to 95 percent reduction from baseline). The State Water Resources Control Board has initiated a proceeding to determine if a more stringent policy to implement the federal rule is appropriate for California. Regional Water Quality Control Boards are initiating new reviews of existing National Pollution Discharge Elimination System (NPDES) permits for cooling water intake structures in accordance with the new 316(b) Phase II Rule.

Work at the Ocean Protection Council and State Lands Commission will also result in more attention to and scrutiny and awareness of the impacts of once-through cooling.

Question 9 – What information can the Energy Commission provide on the impact of this Resolution on our State’s critical energy needs?

The set of issues raised by this question would depend on how coastal power plant owners choose to respond to the resolution over a 14-year time period. California energy markets and technologies are evolving dynamically and what is true in 2006 may be quite different in 2020. It is helpful to identify some basic facts and assumptions about the coastal fleet and the resolution that can be useful in thinking through a response to this question. In addition to the three response options identified earlier – retrofit the cooling system, repower to combined cycle, repower to combustion turbine – an owner could also choose to retire the plant and use the property for other purposes.

First, it is useful to divide the list of 22 coastal power plants with leases from the State Lands Commission or its grantee agencies into categories. In addition to the conditions of the lease, the type and age of the power plant, along with its location and ownership, will influence how an owner chooses to respond and the number of response options that are available. While the 10 facilities with leases from the State Lands Commission seem to have a legal obligation to comply with the proposed staff resolution, it is not clear what legal authority, if any, exists to compel compliance for the other 12 facilities. In addition, several plants have either shut down or announced that they will repower without once-through cooling systems. Furthermore, two of the plants with leases are small (Gaylord and GWF) and do not meet the 50 million gallon per day threshold for large existing power plants as defined by the US Environmental Protection Agency in its recently revised rule for section 316(b) of the Clean Water Act. The Energy Commission maintains a list of 21 large coastal power plants using once-through cooling that does not include these two small facilities. (The Energy Commission list does include the Mandalay facility in Ventura County that is not on the State Lands Commission table of leases.)

Accordingly, it may be that just eight plants with leases from the State Lands Commission would be directly affected by the resolution: Antioch, Pittsburg, Ormond, El

Segundo, Huntington Beach and Encina, plus the nuclear facilities of Diablo Canyon and San Onofre.

In terms of technology, the 21 large coastal plants using once-through cooling can be divided into the following categories:

- Nuclear – 2
- Combined Cycle – 4
- Steam Boilers – 15 (plus the old steam units at Moss Landing)

The Diablo Canyon and San Onofre nuclear plants represent billions of dollars in ratepayer investment and provide important levels of base load electricity generation. They are also critical to maintaining system reliability from both a generation and transmission system perspective. Retrofitting these facilities to cooling towers (dry cooling does not appear to be feasible from an engineering perspective) would be an expensive engineering challenge, even if sources of fresh or reclaimed water were available to supplant the use of ocean water for cooling.

Combined cycle technology is the current state of the art for natural gas-fired power plants. Four plants use this technology. Moss Landing and Haynes were recently repowered with continued use of once-through cooling, while the Harbor Units 1a and 2a were built in 1994. Retrofitting to cooling towers or dry cooling would be technically feasible, but would be costly in light of the recent investments to rebuild these generating units.

For the 15 older steam boiler plants, owners could choose from each of the four previously described project options. Retrofitting the cooling systems to cooling towers or dry cooling would probably not make economic sense given the age and lower operating efficiencies of these units. The economic viability and technical feasibility of changing the cooling technology at the time of repowering depends on specific site considerations. The Morro Bay facility still requires and NPDES permit from the Central Regional Water Quality Control Board. Two facilities – Morro Bay and El Segundo – have licenses from the Energy Commission to repower using once-through cooling that have not been exercised. Two plants – Humboldt and San Diego South Bay – have announced that they will repower without once-through cooling. The Hunters Point facility has been granted permission from the California Public Utilities Commission to retire. Finally, the Long Beach plant has ceased generating electricity, but the once-through cooling pumps are still used to control water levels at the plant.

The location of a facility is also a consideration regarding whether to retire, retrofit or repower. Many areas in California are resource-constrained in terms of local generation and transmission. Several coastal power plants in these areas have Reliability Must Run (RMR) contracts from the California Independent System Operator (CAISO), which obligates the owner to furnish power during periods of critical demand. Nine of the coastal plants have RMR contracts for 2006 for a total of 4,058 MW.

Ownership is another consideration. Merchant generators currently need long-term contracts in order to secure the financing necessary to pay for major facility repowers or retrofits. Publicly-owned utilities, in contrast, have not had difficulty in financing their projects because of their ability to sell bonds. Calpine is in bankruptcy, and Duke is selling its California power plants to LS Power, a privately owned company. Fifteen of the 21 coastal plants are owned by private merchant generators. Passage of the resolution would probably make it more difficult for the merchant owners to secure financing for repowering or upgrading their facilities.

Any generating capacity lost by coastal plant retirements would need to be replaced for electricity supply adequacy purposes and in some cases for transmission stability requirements. If there are transmission-related considerations, the replacement generation might need to be placed in the same general area as the retired coastal plant.

Should the State Lands Commission resolution pass, those existing power plants that would be affected would have two choices, either shut down or modify their facility to eliminate the use of once-through cooling.

For the coastal power plant repowering projects subject to Energy Commission jurisdiction, developers have argued that a requirement to use an alternative cooling technology would render the project uneconomical. While Energy Commission staff has analyzed the costs associated with different cooling technologies and did not accept the assertion of the developers regarding economic feasibility, the question nonetheless remains unanswered regarding economic viability due to a number of factors described above. Consequently, it must be recognized that a State Lands Commission resolution, if passed, could eventually result in the loss of a significant amount of California's generating capacity with adverse impacts to system reliability.

There are two alternatives to once-through cooling. The first would be the continued use of water to cool the power plant, but the source would be fresh or reclaimed water. If the project were under the jurisdiction of the Energy Commission the use of fresh water is unlikely to be permitted, in conformance with a policy adopted by the Commission in its 2003 Integrated Energy Policy Report. The developer would need to use reclaimed water in lieu of fresh water, which is not always available depending on location, or use a dry cooling system. Projects not under Energy Commission jurisdiction would be permitted locally with the lead permitting agency determining what water source could be used for power plant cooling. Currently, it is the policy of the State Water Resources Control Board to discourage the use of fresh water for power plant cooling.

Dry cooling is also an alternative to once-through cooling. This technology is commercially available and has become more common in recent years, particularly in areas where water availability is an issue. However, developers are more comfortable and inclined to use wet cooling technologies because of their greater familiarity with this technology; its lower capital costs; its smaller space requirements; and its greater efficiency, particularly at higher ambient temperatures. The latter issue tends to be more

important at inland sites where summer temperatures are normally much hotter than along the coast. If any of the existing coastal power plants have space limitations, dry cooling may not be an option. In addition, since dry cooling systems are noisier and larger than wet cooling systems, there can be environmental issues regarding visual and noise impacts.

In summary, because of the tremendous dynamism of California energy systems, including varied energy technologies and evolving energy markets, energy policies and environmental regulation, it is not possible to state with any certainty how power plant owners would respond to the State Lands Commission resolution over a 14-year phase in period. However, new generation would be needed to replace the loss of existing coastal power plants. New facilities may need to be located at or near some of the existing coastal power plants due to transmission constraints. Coastal generators would face regulatory and financial market uncertainty that could jeopardize the repowering of coastal plants and state goals for meeting resource adequacy in generation / transmission-constrained areas. Merchant generator ability to secure financing and long-term contracts for repowering is already uncertain. Incremental cost differences for plants with tower cooling or dry cooling could make coastal plants less competitive than other plants. Loss of nexus to coastal waters could jeopardize the coastal-dependent status for coastal plants subject to Coastal Commission jurisdiction. Finally, regardless of the staff proposed State Lands Commission resolution, the ongoing evolution of technology, market conditions, CPUC procurement and environmental regulatory changes could result in the phase-out and replacement of at least some of the coastal fleet.

Several state and federal policies are currently in place to ensure that system reliability goals are met. Load serving entities (LSEs) such as the private and public utilities have an obligation to serve customers and meet electric load. The CPUC Procurement and Resource Adequacy proceedings are intended to ensure that the LSEs have access to sufficient generating resources to meet reserve margins and resource adequacy goals. The CAISO RMR program is intended to assure adequate local generation to maintain system operation as well as to guard against the exercise of market power as was done during the Energy Crisis of 2000-2001. The Federal Energy Regulatory Commission (FERC) Must Offer Tariff requires generators to make their resources available to LSEs. However, should the resolution result in any wholesale retirements of coastal power plants, it is unlikely that these programs would be sufficient to ensure system reliability.

There are other factors to consider when trying to anticipate the effects of the draft resolution on the coastal generators over a 14-year period. The following considerations are drawn from several recent Energy Commission reports.

- Many plants using the older steam boiler technologies are nearing the end of their design life. Their relatively higher heat rates and higher operating costs will continue to render them less competitive over time. More than 3,800 MW of older steam boilers have retired since 2001.
- Current market and system conditions are requiring new capacity to meet peak summer loads, which means that new combustion turbine peaker units may prove to be commercially viable in the near term to serve load centers in coastal areas, rather than base loaded combined cycle facilities. The current coastal plant sites could be appropriate for some of these newer peaker units.
- Notwithstanding current market conditions, new base load generation will be needed to accommodate population growth within the decade, which will create additional demand for base loaded combined cycle units. Such increased demand may incent the owners of coastal plants to repower older facilities, but as previously indicated, decisions will be made on a case-by-case basis.
- The CAISO RMR program is a temporary solution for ensuring capacity that is intended to be phased out.
- The operations of existing coastal power plants that use once-through cooling will be influenced by the increasing scientific knowledge of once-through cooling effects on marine and estuarine ecosystems, the pending State Water Board policy implementing the US EPA 316(b) rule, and concerns over endangered species affected by once-through cooling.